

VI. A COLLECTION OF PALEOCENE MAMMALS FROM  
BEAR CREEK, MONTANA.

BY GEORGE GAYLORD SIMPSON.

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After the discovery of a new locality for Fort Union mammals in 1926 by Dr. J. C. F. Siegfriedt, collections were made in the summer of 1927 by Barnum Brown for the American Museum of Natural History and by J. LeRoy Kay for the Carnegie Museum. Mr. Kay also worked this deposit for some time during the winter of 1927-28. The original collection made for the American Museum has already been described elsewhere<sup>1</sup>, and the collection in the Carnegie Museum, in so far as it adds to previous knowledge, is here considered. I am indebted to the authorities of the Carnegie Museum for the privilege of making this study. The illustrations in this paper, except Fig. 4, are from drawings by Mr. Sydney Prentice.

All of these mammals are from a layer of carbonaceous clay above Coal Vein No. 3, in the Eagle Mine, Bear Creek, Carbon County, Montana. A revised list, including all the mammals so far identified in the collections of the American Museum, the Carnegie Museum, and that of Dr. Siegfriedt, follows:

INSECTIVORA.

Family PLAGIOMENIDÆ.

**Planetetherium mirabile** SIMPSON.

Family NYCTITHERIIDÆ.

**Protentomodon ursivalis** SIMPSON.

Family PANTOLESTIDÆ.

**Pentacodon cf. inversus** COPE.

Family LEPTICTIDÆ.

**Leptacodon (Leipsanolestes) siegfriedti** (SIMPSON).

INSECTIVORA OR PRIMATES.

Family PLESIADAPIDÆ.

**Plesiadapis** sp. indet.

**Labiodolemur kayi**, sp. nov.

<sup>1</sup>Simpson, G. G., 1928. A New Mammalian Fauna from the Fort Union of Southern Montana. Amer. Mus. Novitates, No. 297.

Family TARSIIDÆ.

**Carpolestes nigridens** SIMPSON.

TÆNIODONTA.

Family STYLINODONTIDÆ.

..**Psittacotherium** sp.

CREODONTA.

Family OXYCLÆNIDÆ.

**Thryptacodon pseudarctos** SIMPSON.

Family MESONYCHIDÆ.

**Dissacus cf. navajovius** COPE.

## DESCRIPTIONS.

Order INSECTIVORA.

Family PLAGIOMENIDÆ Matthew, 1918.

**Planetetherium mirabile** SIMPSON, 1928.

The new material permits important emendations and additions to our knowledge of this curious animal. The heel of  $M_3$  proves to have been badly preserved in the specimen previously figured<sup>2</sup>, but is complete and nearly unworn in Carn. Mus. Cat. Vert. Foss., No. 11,700. On the heel the hypoconid is low and single. The external

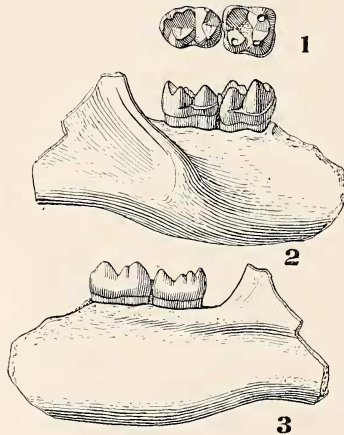


Fig. 1. *Planetetherium mirabile* Simpson. C. M. Cat. Vert. Foss., No. 11,700.  
1. Crown view; 2. External view; 3. Internal view. Enlarged 3 diameters.

<sup>2</sup>Amer. Mus. No. 22,161. Simpson, Am. Mus. Novitates, 297, 1928, p. 13. fig. 8.

and posterior sides of the basin are formed by a single oblique wall, the main part of which is constituted by two subequal cusps, the entoconid and hypoconulid. Anterior and slightly external to the former is a small and imperfectly differentiated cuspule, and internal and slightly posterior to the hypoconulid is a still smaller cuspule.

Most valuable of the new material referable to this species is a right upper jaw with P<sup>3</sup>-M<sup>1</sup>, Carnegie Museum Cat. Vert. Foss., No. 11,671. This confirms the generic reference of the two teeth previously described<sup>3</sup> but shows that the analogies used in identifying their positions in the series were false. The supposed M<sup>2</sup> is probably P<sup>4</sup> and the supposed P<sup>4</sup> is probably P<sup>3</sup>. Little doubt attaches to the specific reference of the present specimen. It occludes perfectly with the lower teeth of this species and its dental characters are harmonious.

P<sup>3</sup> is submolariform, but is longer and narrower than the molars; the styles small and nearly in line with the paracone and metacone, the latter imperfectly separated and the metacone the smaller of the two; conules absent, protocone reduced and talon-like. There was a short diastema in front of this tooth. P<sup>4</sup> has previously been described (as M<sup>2</sup>). It is fully molariform and has a blunt protocone, directed somewhat forward, two small equal conules, large equal paracone and metacone, distinct metastyle directly external to the metacone, small parastyle anterior to the paracone, and an irregular external cingulum. M<sup>1</sup> is somewhat similar, but is less oblique and has a longitudinal series of four small cusps between the paracone and metacone and the external cingulum. On both P<sup>4</sup> and M<sup>1</sup> there are narrow, regular anterior and posterior cingula, as well as the irregular external cingulum, but they do not extend forward upon the base of the protocone and there is no trace of a hypocone.

The mental foramen is above the anterior root of P<sup>3</sup>. The zygoma arises chiefly above M<sup>1</sup> and its root is flattened and excavated laterally.

This new material permits an important step forward in the interpretation of the relationships of this extraordinary genus. The structure of the parts now known is so distinctive from other groups, but so similar to that of *Plagiomene* Matthew from the Wasatch<sup>4</sup> that intimate relationship with the latter can hardly be questioned. Among the numerous points of resemblance may be noted the following: fully molariform P<sup>4</sup>/<sub>4</sub>; molar paraconids reduced, median; protoconid and metaconid subequal; talonid structure almost identical; external cingulum on lower molars; rugose enamel; upper molar structure almost identical; mental foramen and anterior root of zygoma similar in position and structure.

*Planeletherium* is thus to be placed in the family *Plagiomenidae*

<sup>3</sup>Amer. Mus. Nos. 22,160, 22,168. Simpson, *loc. cit.*, 1928, pp. 12-13, fig.9.

<sup>4</sup>Matthew, W. D., 1918. Bull. Am. Mus. Nat. Hist., XXXVIII, p. 598-602.

among the Insectivora. There is nothing definite to add regarding the dubious relationships of this family. Matthew has suggested tentatively that it may be related to the *Galeopithecidae* and the evidence on this point is not materially altered by the addition of this more ancient genus to the family.

Family LEPTICTIDÆ, GILL, 1872.

Genus LEPTACODON, Matthew & Granger, 1921.

*Diagnosis:* Trigonids lower than in *Diacodon*, paraconids distinct, but small; protoconids nearly equal to metaconids, or slightly higher. Molars reduced in size from first to third. Heel of  $M_3$  with three subequal cusps, hypoconulid strongly projecting posteriorly, but not excluded from basin.  $P_4$  with small metaconid almost connate with the protoconid, heel with small narrow internal basin and long external slope.

*Type:* *L. tener* Matthew & Granger, 1921.

Restudy of *Leipsanolestes* Simpson persuades me that I was in error in distinguishing this genus too sharply from *Leptacodon* and in not referring it to the *Leptictidae*. It now seems best to consider it as a subgenus only. Aside from further study of the original material, this conclusion is based on new and better specimens in the collection of the Carnegie Museum and also on publication of further data regarding *Adapisorex*, an allied European genus, by Teilhard.<sup>5</sup> The resemblance of *Leipsanolestes* to *Adapisorex* remains, of course, but it is less close than to *Leptacodon*, and Teilhard has now shown that the genus *Adapisorex* is leptictid in structure and that the family *Adapisoricidae* has little claim to conservation. As Teilhard points out, this altered conception tends to invalidate the view of Lemoine, Matthew, and others, that the *Adapisoricids* were ancestral to the *Tupaïids*, although it does not preclude a close collateral relationship.

Subgenus LEIPSANOLESTES Simpson.

*Diagnosis:* Internal cusps of lower molars more elevated relative to external cusps than in typical *Leptacodon*. Hypoconulid of  $M_{1-2}$  not projecting quite so far posteriorly. Cusps slightly stouter.

*Type:* *Leptacodon (Leipsanolestes) siegfriedti* (Simpson).

**Leptacodon (Leipsanolestes) siegfriedti** (Simpson), 1928.

This species was sufficiently characterized in the original publication. Although a small form, it is generally more robust than *Leptacodon tener*. One of the new specimens, a right lower jaw with  $P_4$ - $M_3$

<sup>5</sup>P. Teilhard de Chardin, 1927. Mém. d. Musée Roy. d'Hist. Nat. Belgique, No. 36, p. 7-11. A copy of this important work did not reach me until after the publication of my first paper on the Bear Creek fauna.

(Carnegie Mus. Cat. Vert. Foss., No. 11,553), differs from a previously figured specimen<sup>6</sup> in having P<sub>4</sub> slightly more robust, the heel basin wider, but this is insufficient for specific distinction.

#### INSECTIVORA OR PRIMATES.

Family PLESIADAPIDÆ Trouessart, 1897.

Genus LABIDOLEMUR Matthew & Granger, 1921.

*Diagnosis:* Dental formula probably I<sub>1</sub> C<sub>0</sub> P<sub>1</sub> M<sub>3</sub>. One greatly enlarged procumbent incisor, crown completely enameled, trihedral, with knife-like supero-external margin, tip curved upwards, large root extending back beneath cheek-teeth. P<sub>4</sub> reduced, with simple recurved apex and unbasined heel. Molar trigonids elongate, subquadrate. Protoconid and metaconid subequal, the latter somewhat the more posterior. Paraconid antero-internal, small but distinct, well removed from the larger metaconid. A minute, ridge-like fourth trigonid cusp anterior to the protoconid, progressively less distinct from M<sub>1</sub> to M<sub>3</sub>. Talonids on M<sub>1-2</sub> wide, basined, cusps of elevated rim indistinctly differentiated. Trigonid of M<sub>3</sub> about same size as that of M<sub>2</sub>, talonid very slightly longer, with a simple oval basin surrounded by a continuous, obscurely cuspidate rim. Jaw relatively short and deep, with posterior mental foramen beneath molars.

*Type:* *Labidolemur soricoïdes* Matthew & Granger.

The above diagnosis extends and somewhat alters that given by Matthew and Granger in the original description of the genus,<sup>7</sup> the changes being due to the present Fort Union specimen and to a re-study of the original genotypic materials on this basis. The peculiarity of the trigonid is recognized in more detail. M<sub>3</sub>, especially, is believed to be quite different from that originally referred to the genus. The authors of the genus drew their conception of M<sub>3</sub> from two supposed topotypes of *L. soricoïdes* (from the Mason Pocket of the Tiffany Beds in southwestern Colorado), one including M<sub>2-3</sub> and the other an isolated M<sub>3</sub>. I believe the reference of these specimens to this species probably to have been incorrect. In the referred M<sub>2</sub> the trigonid is very short, with subequal and almost connate paraconid and metaconid, and the heels of the referred last molars are bilobed and very elongate. This sort of M<sub>3</sub> could not belong in the alveoli of the type of *L. soricoïdes*, it is too large, too elongate, the posterior root too large in proportion to the anterior. The Bear Creek specimen described below is very close to *L. soricoïdes* in the structure of M<sub>1</sub>. Its type of last lower molar could well be accommodated by the alveoli of the genoholotype, allowing for difference of species, and is much more harmonious with M<sub>1</sub> in structure than are the posterior molars referred to the genus by Matthew and Granger.

<sup>6</sup>Amer. Mus. No. 22,179. Simpson, *loc. cit.*, 1928, fig. 3a.

<sup>7</sup>Matthew, W. D., and Granger, W. 1921. Amer. Mus. Novitates, No. 13, p. 4.

An incisor from the Bear Creek deposit has previously been referred to *Labidolemur*<sup>8</sup>. Its root is of the same size and proportions as that preserved in the present specimen and it probably belonged to the same species.

The systematic position of this genus is very uncertain. The molar type is unique, but finds its closest analogies among some of the early Tarsioids. The resemblance is not conclusive, but this general molar type combined with reduced ante-molars and an enlarged procumbent incisor permits inclusion in the *Plesiadapida*. This reference, it must be emphasized, is based as much on the default of evidence as on its presence. The genus is so distinct from the more normal *Plesiadapids* (as *Plesiadapis*, or *Nothodectes*, itself) that real relationship is not assured.

***Labidolemur kayi*, sp. nov.**

*Type:* C. M. Cat. Vert. Foss., No. 11,703. Part of left lower jaw with P<sub>4</sub>-M<sub>3</sub>. Collected by J. LeRoy Kay, 1928.

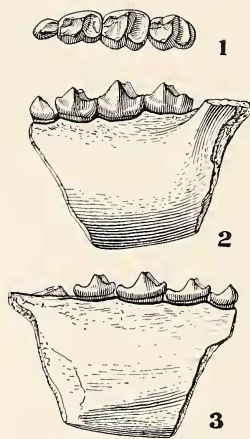


Fig. 2. Left lower jaw of *Labidolemur kayi*, sp. nov. Simpson. Type C. M. Cat. Vert. Foss., No. 11,703. 1. Crown view; 2. External view; 3. Internal view. Enlarged 3 diameters.

*Horizon and Locality:* Paleocene, Fort Union Series, Eagle Coal Mine, Bear Creek, Carbon County, Montana.

*Diagnosis:* Paraconid and anteroexternal cusp of M<sub>1</sub> somewhat more distinct, less crest-like, than in *L. soricooides*. Molars slightly larger, length M<sub>1-3</sub>: 5.7 mm. Jaw relatively deeper, 5.1 mm. in depth below M<sub>2</sub> internally.

<sup>8</sup>Simpson, G. G., *loc. cit.* 1928, p. 15.

## TÆNIODONTA.

Family STYLINODONTIDÆ Marsh, 1875.

*Psittacotherium*, sp. indet.

C. M. Cat. Vert. Foss., No. 11,560, presented by J. F. Lobdell, superintendent of the Eagle Mine, is a right lower canine of a Tæniodont allied to *Psittacotherium*. It does not belong to any described species, and on the evidence of this tooth alone might be a rather advanced species of *Psittacotherium*, a primitive species of *Calamodon*, or a distinct form. From *Psittacotherium multifragum* of the Torrejon

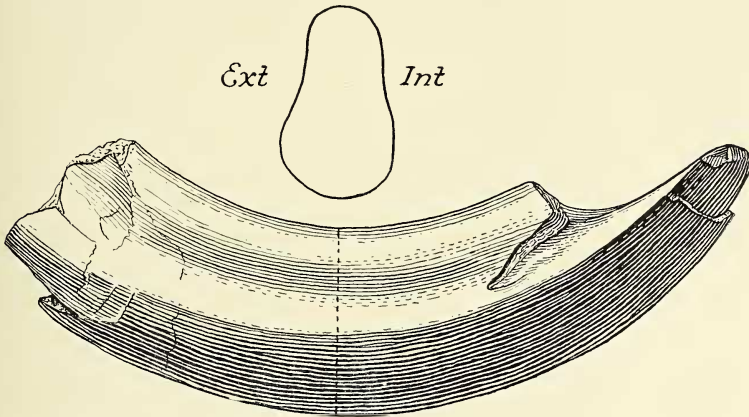


Fig. 3. Right lower canine of *Psittacotherium* sp. indet. C. M. Cat. Vert. Foss., No. 11,560. Slightly reduced.

it differs chiefly in the more compressed posterior, enamel-free portion, and the apparently more persistent, possibly continuous, growth. From *Calamodon simplex* of the Wasatch it differs chiefly in the relatively smaller anteroposterior diameter, shorter length along axis of growth, enamel band not extending quite so far upon the lateral faces, and the absence of longitudinal grooves on the enamel.

Nearly the whole of the tooth is preserved. It is well worn, but growth and enamel deposition were still in progress. The enamel is slightly rugose, but without definite grooves or ridges. The anteroposterior diameter is 27 mm., maximum transverse diameter 16 mm., length along anterior curve 128 mm. (a few millimeters broken off posteriorly).

## CREODONTA.

Family MESONYCHIDÆ Cope, 1875.

*Dissacus* cf. *navajovius* (Cope), 1881.

The presence of *Dissacus* at Bear Creek is established by two teeth in the collection of J. C. F. Siegfriedt, examined through the

kindness of the owner. A second upper molar (Carnegie Museum, Cat. Vert. Foss. No. 11,693, a cast presented by Dr. Siegfriedt) is slightly broader than the corresponding tooth of *D. navajovius* but is not sufficiently well preserved for close comparison. The second specimen, a left  $M_2$ , is slightly larger than in *D. navajovius*, the metaconid lower and more anterior, the paraconid relatively a little larger, the heel lower (possibly from wear). The internal basal swelling is also straighter and less depressed below the posterior notch. The metaconid is lower, the paraconid relatively larger, and the talonid relatively smaller than in *D. navajovius longævus* from the Wasatch. Save for its larger size, the closest resemblance is with *D. europæus* and *D. gaudryi* (possible synonyms) from the French Thanetian. The material does not warrant any exact reference.



Fig. 4. Internal views of second left lower molars of various species of *Dissacus*. A. *Dissacus navajovius*; B. *D. sp.?* from Ft. Union; C. *D. europæus*; D. *D. gaudryi*; E. *D. filholi*; F. *D. prænuntius*; G. *D. navajovius longævus*. (C-E after Teilhard de Chardin).